SYLLABUS
in the discipline "Physics"
for students of the first (bachelor's) level of higher education
specialties 152 Metrology and information-measuring equipment
educational and professional program Quality of products, processes and software
Kharkiv National University of Radio Electronics

1.	Name of the faculty	Faculty of Infocommunications
2.	Level of higher education	bachelor
3.	Code and name of the specialty	152 Metrology and information-measuring equipment
4.	Type and name of educational program	Quality of products, processes and software
5.	Code and name of the discipline	Physics
6.	Number of ECTS credits	6
7.	Discipline structure (distribution by types and hours of study)	**1st semester** 90 hours, of which: lectures 20 hours, practical 10 hours, laboratory 12 hours, consultations 6 hours, independent work 42 hours **2nd semester** 90 hours, of which: lectures 20 hours, practical 8 hours, laboratory 8 hours, consultations 6 hours, independent work 48 hours
8.	The schedule of studying the discipline	1 course; 1,2 semesters
9.	Prerequisites for studying the discipline	Knowledge of the main sections of higher mathematics, in particular linear and vector algebra, differential and integral calculus
10.	Discipline abstract	**Content module 1. Electrostatics and direct current.** Theme 1. Electric field in vacuum. Theme 2. Electric field in dielectrics. Theme 3. Conductors in an electric field. Theme 4. Electric current. **Content module 2. Magnetism.** Theme 5. Magnetic field in vacuum. Theme 6. Magnetic field in matter. Theme 7. The phenomenon of electromagnetic induction. Theme 8. Electromagnetic field. **Content module 3. Electromagnetic oscillations and waves. Optics.** Theme 9. Electromagnetic oscillations and alternating current**..** Theme10. Electromagnetic waves. Theme 11. Wave optics. Theme 12. Quantum optics**.** **Content module 4 Elements of quantum mechanics** Theme 13. Quantum mechanics. Theme 14. Quantum theory of the structure of atoms and molecules. Theme 15. Spontaneous and forced radiation.
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the learning process	**Competences that provide the study of the discipline:** Ability to abstract thinking, analysis Ability to apply knowledge in practical situations Use the results of independent search, analysis and synthesis of information from various sources to effectively solve specialized problems of professional activity Analyze, argue, make decisions in solving complex specialized problems and practical problems in professional activities, which are characterized by complexity and incomplete definition of conditions, be responsible for the decisions made

<table>
<tr><td></td><td></td><td>To adapt in the conditions of frequent changes of technologies of professional activity, to predict the final result.
Critically comprehend the basic theories, principles, methods and concepts in teaching and professional activities</td></tr>
<tr><td>12.</td><td>Learning outcomes of higher education</td><td>The study of this discipline gives the student the opportunity to:
know: physical laws and fundamental physical concepts, laws and theories of classical and modern physics, the essence of physical phenomena, areas of their practical application, physical principles of operation of modern technological equipment and apparatus in the field of professional activity; purpose and possibility of using experimental equipment for physical research.
be able to: use the results of independent search, analysis and synthesis of information from various sources for the effective solution of specialized tasks of professional activity; analyze, argue, make decisions when solving complex specialized tasks and practical problems in professional activity, characterized by the complexity and incomplete certainty of the conditions, be responsible for the decisions made, adapt in the face of frequent changes in the technologies of professional activity, predict the final result; critically comprehend the basic theories, principles, methods and concepts in education and professional activity.
have: the ability for abstract thinking, analysis and synthesis; the ability to apply knowledge in practical situations, the ability to search, process and analyze information</td></tr>
<tr><td>13.</td><td>Assessment system according to each task for passing the exam</td><td>To evaluate the student's work during the semester, the final rating O_{sem} is calculated as the sum of grades for different types of classes and control activities, which include practical classes, laboratory work and modular testing.
The distribution of points for different types of classes / tests is given in the table:
Semester 1
<table>
<tr><th>Control measure</th><th>Rating O_{sem}</th></tr>
<tr><td>Lw №1</td><td>2 . . . 4</td></tr>
<tr><td>Lw №2</td><td>2 . . . 4</td></tr>
<tr><td>Lw №3 Control lesson</td><td>5 . . . 10</td></tr>
<tr><td>Pc №1</td><td>4 . . . 7</td></tr>
<tr><td>Pc №2</td><td>4 . . . 7</td></tr>
<tr><td>Pc №3</td><td>4 . . . 7</td></tr>
<tr><td>Test</td><td>11 . . . 14</td></tr>
<tr><td>Checkpoint 1</td><td>32 . . . 53</td></tr>
<tr><td>Lw №4</td><td>2 . . . 4</td></tr>
<tr><td>Lw №5</td><td>2 . . . 4</td></tr>
<tr><td>Lw №6 Control lesson</td><td>5 . . . 10</td></tr>
<tr><td>Pc №4</td><td>4 . . . 7</td></tr>
<tr><td>Pc №5</td><td>4 . . . 7</td></tr>
<tr><td>Test</td><td>11 . . . 15</td></tr>
<tr><td>Checkpoint 2</td><td>28 . . . 47</td></tr>
<tr><td>Total for the semester</td><td>60 . . . 100</td></tr>
</table>
Semester 2
<table>
<tr><th>Control measure</th><th>Rating O_{sem}</th></tr>
</table></td></tr>
</table>

Lw №1	3 . . .	5
Lw №2	3 . . .	5
Pc №1	4 . . .	7
Pc №2	4 . . .	7
Test	10 . . .	19
Checkpoint 1	**24 . . .**	**43**
Lw №3	3 . . .	5
Lw №4 Control lesson	13 . . .	18
Pc №3	4 . . .	7
Pc №4	4 . . .	7
Test	12 . . .	20
Checkpoint 2	**36 . . .**	**57**
Total for the semester	**60 . . .**	**100**

As a form of final control for the discipline "Physics" credit is used in semester 1. The final grade is determined as the number of points received by the applicant for education for completing control activities during the semester.

The combined exam is used as a form of final control for the discipline "Physics" in semester 2. With this type of control, the final grade is calculated by the formula: $P_n = 0{,}6 \cdot O_{sem} + 0{,}4 \cdot O_{ex}$, where O_{sem} – grade for the semester in a 100-point system, O_{ex} – grade for the exam in a 100-point system.

The final grade is translated into national and ECTS according to the scale:

Grade from the discipline	Score on a national scale		ECTS scale score
	exam	credit	
96-100	5 (perfectly)	passed	A
90-95	5 (perfectly)		B
75-89	4 (good)		C
66-74	3 (satisfactorily)		D
60-65	3 (satisfactorily)		E
35-59	2 (unsatisfactorily)	not passed	FX
1-34			F

14.	The quality of the educational process	The content of the discipline can be updated depending on the modern needs of the specialty
15.	Methodical support	**Basic literature** 1. General physics with examples and problems. Part 2. Electricity and magnetism: textbook. manual./ IM Kibets and others. - Kharkiv: SMITH Company, 2009-424p .; 2. General physics with examples and problems. Part 3, item 1. Optics: textbook / IM Kibets and others. - H.: SMITH Company, 2012. - 232p. **Supporting literature** 1. Collection of tests from the course of physics / O.M. Kovalenko and others.- Kharkiv: KNURE, 2006.-124p. 2. Dictionary of physical terms: textbook / TB Tkachenko.- Kharkiv: KNURE, 2004.-80p. **Methodical instructions for different types of classes** 1. Methodical instructions for software in the course of physics (part 1) / Edited by: VO Storozhenko and others. –Kharkiv: KhNURE, 2013.-152p.

		2. Methodical instructions for software in physics (part 2) / Edited by: VO Storozhenko and others. –Kharkiv: KhNURE, 2013.-140p. 3. Methodical instructions for laboratory work in physics. Part 2. Electricity and magnetism. / Edited by: RP Orel and others. - Kharkiv: KNURE, 2019. - 120p. 4. Methodical instructions for laboratory work in physics. Part 3. Optics. Atomic physics and solid state physics / Emphasis. Malik SB etc. - Kharkiv: KNURE, 2011. 5. Methodical instructions for computer laboratory work in physics./ O.M. Kovalenko and others.- Kharkiv: KNURE, 2006-124p. **Information support:** http://physic.nure.ua http://catalogue.nure.ua/knmz/?subdivision=24&level=0&query=undefined
16.	Syllabus developer	Head of the Department of Physics Kovalenko Olena Mykolayivna, olena.kovalenko@nure.ua